DOCUMENT RESUME

ED 155 151 95 SP 012 740

AUTHOR DeVault, Marjorie L.; And Others
TITLE Curricula, Personnel Resources, and Grouping Strategies.
INSTITUTION Central Midwestern Regional Lab., St. Ann, Mo. ML-GROUP for Policy Studies in Education.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.; Spencer Foundation, Chicago, Ill.
PUB DATE Mar 77
GRANT NIE-G-77-0004
NOTE 91p.

EDRS PRICE MF-$0.83 HC-$4.67 Plus Postage.
DESCRIPTORS Class Organization; *Classroom Research; *Evaluation Criteria; *Grouping (Instructional Purposes); Instructional Staff; *Resource Allocations; *Staff Utilization
IDENTIFIERS *Achievement Factors

ABSTRACT

Teacher management of the extensity (duration) and intensity (abundance) of resources is identified as a major factor in pupils' active learning in classroom situations (time and effort expended in learning a task). Seven compensatory education curricula evaluations in the Project Follow Through Study ('74) serve as the data base for the analysis. Personnel resource extensity of each of the curricula is examined, and the relationship between teaching strategy and these resources is determined and related to pupil's educational experience (grouping and time allocation of personnel). The values of critical resource variables (number of teachers, aides, volunteers, enrollment figures, attendance) in the seven studies are tabulated and compared to determine resource intensity, and the use of teaching strategies is determined both in this resource context and in the context of experiences deemed desirable for compensatory education programs (curricular issues, grouping, and individualization strategies, instructional roles). Data indicate that (1) curricular selection is related to resource availability; (2) similarly resourced classes vary considerably in grouping sizes and in the extensiveness of individual work; (3) grouping and individualization are strongly dependent on the curriculum; (4) strategies may be strongly goal related; (5) small group and individual work of aides generally follows the same pattern as that of teachers; and (6) volunteers and aides are not generally used to free the teacher for more direct pupil instruction. It is concluded that curricular approach and goals, time allocations, grouping and individualization strategies, and teaching and supervisory personnel must all be taken into account in assessing effectiveness. Curricular goals are necessary for evaluating pupil outcome; time allocations represent teaching extensity; and the remaining factors represent teaching-learning intensity. (MJB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

File Copy
Rec'd 6/3/77
SP

ED155151

Curricula, Personnel Resources, and Grouping Strategies*

Marjorie L. DeVault

Annegret Harnischfeger

and

David E. Wiley

ML-GROUP for Policy Studies in Education

CEMREL, Inc.

March, 1977

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

---

*The authors assume joint and equal responsibility for this work. David E. Wiley is on leave from the University of Chicago. This work was partially supported by the Spencer Foundation and by the National Institute of Education (grant No. NIE-G-77-0004).

Special thanks are due to Jane Stallings who graciously and rapidly provided us with the data analyzed. Her study, especially its thoughtful design and careful execution, stimulated our ideas and allowed us to carry them to fruitful exhibition.

SP 012 740

TABLE OF CONTENTS

1. Extensity and Intensity of Schooling: An Implicative Distinction..... 1

2. Classroom Resources and Teaching Strategy..... 7

2.1 Resource Extensity..... 9

2.2 Personnel Resources and Their Relation to Teaching Strategy..... 10

2.2.1 Resources and Strategy: An Illustration..... 11

2.2.2 The Determination of Pupil Experience..... 13

2.3 Resource Intensity..... 16

2.4 The Comparison of Teaching Strategies: An Example..... 19

3. Teaching Strategy: Interpretations..... 24

3.1 Curricular Issues..... 25

3.2 Grouping and Individualization Strategies: Illustrations from Follow-Through..... 28

3.2.1 Follow-Through Classes: An Overview..... 29

3.2.2 Small Group and Tutorial Instruction..... 32

3.2.3 Time Spent Without Pupils and With Large Groups..... 36

3.3 Instructional Roles: A Summary..... 39

3.4 Grouping and Individualization: A Display..... 41

4. Curricula, Resources, and Strategies: Some Conclusions..... 43

References..... 48

Tables..... 49

Figures..... 58

TABLE OF CONTENTS (cont'd)

Appendices

A.I The Follow-Through Classroom Observation Evaluation..... A.1

A.II Curricular Summaries..... A.4

A.III Resource and Grouping Profiles for Follow-Through Curricula and Comparison Classes..... A.10

A.IV Conversion of Instructional to Pupil Time..... A.20

List of Tables and Figures

Tables

1. Personnel Resources and Time Distributions to Groupings for Comparison Classes (First Grade)
2. Resource Profiles for Follow-Through Curricula (First Grade)
3. Resource Profiles for Follow-Through Curricula (Third Grade)
4. Teaching Strategies of Bank Street and Kansas Classes in Resource-Comparable Sites (First Grade)
5. Time Distributions for Instructional Personnel (Percentage of Time Teachers, Aides and Volunteers Spend in Instructional Groupings)
6. Percentage of Time Teachers, Aides, and Volunteers Spend in Small Group Instruction (3-8 Pupils) by Curriculum
7. Percentage of Time Teachers, Aides, and Volunteers Spend with One or Two Pupils by Curriculum
8. Percentage of Time Teachers, Aides, and Volunteers Spend Without Pupils by Curriculum
9. Percentage of Time Teachers, Aides, and Volunteers Spend in Large Group Instruction (Pupils > 8) by Curriculum

Figures

1. Time Distributions to Groupings for First Grade Teachers and Aides in Follow-Through Curricula and Comparison Classes
2. Time Distributions to Groupings for Adults in Follow-Through Curricula and Comparison Classes (First and Third Grades)

1. Extensity and Intensity of Schooling: An Implicative Distinction

Pupils' learning experiences -- more precisely the amount of time that pupils spend actively learning -- and pupils' characteristics, including their cognitive capabilities, are the sole proximal and distinctive determinants of achievement. Pupils' active learnings are influenced by the instruction offered via the allocation and use of instructional time and also via pupil motivation. This theoretical stance is strongly emphasized by three models of school learning (Carroll, 1962, 1963, Bloom, 1976; Harnischfeger & Wiley, 1976; see also Harnischfeger & Wiley, 1977) and empirical evidence shows the central importance of these concepts and their relation in learning. The productive investigation of instructional determinants of achievement could therefore, profitably focus in two issues:

-- the determinants of pupils' active learning time and,
-- the content of learning.

In this paper, we will not discuss the content and goals of school learning, but rather restrict our focus to the determiners of pupils' active learnings in classroom situations.

Active learning has two conceptual parts which are important to distinguish for educational policy and practice:

-- the effort a pupil spends in trying to learn a task, and

-- the duration of this activity.

It is obvious that a pupil who is willing to spend much effort in learning, will not acquire knowledge, if he is not allowed time to learn and, on the other hand, it is common experience that pupils vary enormously in their active learning even when allowed equal amounts of learning time. However, we would assume that, within boundaries, an increase in allocated learning time would increase the total amount of active learning time and thus achievement. In other words, if we extend schooling, we expect more achievement. But we could also focus on the relative amounts of time that pupils spend actively learning and we could increase those amounts of active learning time during schooling. We would thus increase achievement via intensifying schooling and the learning experiences within it. Both aspects of school learning and achievement, the extensive and the intensive, are vitally important in allocating resources. And both means are used to increase achievement.

Extensity of educational activities can be simply and importantly quantified as their durations: number of school years, lengths of school years and school days, subject matter allocations, and individual absence rates. On the other hand, intensity of schooling might be described by the density of teacher/pupil relations, materials, equipment, and other school-related personnel. Thus, small classrooms and those with teacher aides or specialists,

plentiful books, and curricular materials, and ample equipment may be characterized as educatively intensive, regardless of the total hours of instruction in the school day or year.

As the extent or duration of educational experiences and thus also the total amounts of pupils' active learning time increase, the quantities of resources consumed increase concomitantly. As pupils spend more years, months, days, or hours in school, their total quantity of active learning time increases, but so do expenditures for teachers' salaries, books, materials, and school facilities. Intensifying schooling by decreasing class sizes or augmenting the ratio of instructional personnel to pupils or by improving materials and equipment also results in more active learning time, but it likewise consumes additional resources without necessarily augmenting the amount of schooling.

There is much controversy over the consequences of such changes for achievement. The controversy is exacerbated by the fact that educational research on school effects has not conceptually differentiated extensive from intensive parts of schooling. Investigation confounded intensive aspects, such as teacher characteristics, with mixtures of extensive and intensive, such as library volumes and staff expenditures, and ignored or miscategorized the extensive aspect. Consequently, policy decisions concerning extensive or intensive aspects of resource allocations have been formed on dark and slithery grounds.

However, spanning over the past decade, we find that additional resources were used mostly to intensify schooling and only relatively small amounts were used to extend schooling, usually by offering summer school sessions. The largest amounts of additional resources during this time period were provided by the federal government under the Elementary and Secondary Education Act of 1965, intended to overcome educational disadvantages caused by poverty. The resources that were expended during the past decade, were overwhelmingly used to increase the numbers of teaching personnel per pupil, i.e., to decrease class size; to hire more teachers, specialists, teacher aides; to recruit more volunteers; or to intensify schooling through developing materials, meant to be more effective. The reduction of the ratio of pupils to instructional personnel is based on the conviction that the more pupils can interact with teachers, the higher their achievements will be; presumably because these interactions promote additional active learning. Teacher specialists were employed on the basis that specific learning problems can be more effectively and efficiently overcome by teachers with special skills for treating a defined problem area, mostly in reading.

This increase in classroom resources has no direct effect on pupil achievement, but only indirect effects through pupil activities which, in elementary school, are primarily determined by the

teacher. We therefore have to focus on how the teacher makes use of these resources and then investigate the likely consequences for pupil learning and achievement.

An increase in the numbers of classroom instructional personnel or a reduction in the numbers of pupils they confront faces the teacher with new management tasks. She has to reconsider grouping and individualization strategies, sequencing of task and materials so that specialists, aides, and volunteers can be employed effectively considering their time commitments and skills. Surely, teacher training has rarely prepared classroom teachers for these management tasks. However, the ways in which the teacher allocates or re-allocates available resources will definitely affect pupil achievement.

-- Do teachers employ similar strategies of grouping and individualization, if they are in control of similar personnel resources and have similar class sizes?

-- How are aides and volunteers used by teachers?

-- Do specially-developed curricula require specific resource allocations before they can be distinctively implemented?

-- Are the curriculum and training based on it likely to influence grouping and individualization strategies?

Our questions aim at one issue: The investigation of determinants of teacher-pupil interaction, especially of its density. Tutoring, small- or large-group or whole-class instruction allow differential density of teacher-pupil interaction. Assuming that, in general, more interaction will result in more learning, because of more tailored feedback, teachers' grouping and individualization strategies are effective instructional tools for pupil achievement.

Our investigation and its conceptualization draw on several data bases, primarily concerned with compensatory education, the area which received an enormous resource increase over the last decade. As these extra funds were mostly used to intensify schooling and especially for reducing teacher-pupil ratios, we will analyze the consequences of such resource increases for teacher-pupil interaction.

2. Classroom Resources and Teaching Strategy

Teaching strategy, and most importantly decisions about grouping and individualization, determine the timing and condition the content of pupils' educational experiences. But the implementation of a particular strategy is always bounded by resource constraints. The length of the school day and year, the physical facilities and curriculum materials, and the number and type of teaching personnel all determine the resource context within which instructional decisions are made.

The assessment of teaching strategy and its determination are the main foci of our investigation. In what follows, a specific data base will play a key role in defining, articulating, and exemplifying teaching strategies and their relations to educational resources and curricular specifications. In 1974/75 seven compensatory education curricula were evaluated through intensive classroom observation in a study of Project Follow Through (Stallings and Kaskowitz, 1974). A description of this study, which provided our data base, and its design is given in Appendix A.I. The specific curricula evaluated

will, in what follows, be referred to in terms of the institutions which developed them. [1)]

These Follow Through Curricula were intended to provide a primary school experience which supported and augmented the accomplishments of pupils who had participated in Head-Start preschool programs. Implementation of all curricula involved the provision of supplementary resources. These curricula, however, were based on distinct educational perspectives, and thus could have utilized these additional resources quite differently. The observational data, which allow detailed accounting of the settings in which adults and pupils spend their time, permit examination of both the extensive and intensive aspects of resource allocation and of their consequences for pupils' school experiences.

---

1) The seven were developed by the Educational Development Corporation (EDC), The University of Arizona (Arizona), the Far West Laboratory for Educational Research and Development (Far West), The Bank Street College of Education (Bank St.), the High/Scope Educational Research Foundation (High/Scope), the University of Kansas (Kansas), and the University of Oregon (Oregon). A summary description of each curriculum is given in Appendix A.II.

2.1 Resource Extensity

Each of the Follow-Through curricula was implemented in several diverse locations. At these locations, available levels of some of the resource types were determined independently of curricular approach. The length of the school day, for example, is established at the district level and is usually not modified when a new program is selected. The implementation of the curriculum thus occurs within existing time or resource extensity constraints.

There is considerable variation in these school-day lengths across the districts in which the curricula were implemented. The original observational study was conducted in first and third grade classrooms at each location. The school districts' mean day length was about six hours at each grade level and the standard deviation just over thirty minutes.

However, even though extensity of schooling was determined prior to these curricular selections, the selection process could still have produced systematic curriculum differences in the lengths of the school day, which might have obscured the effects of other characteristics. In fact, despite this potentiality, for most of the curricula the selection process created little systematic deviation from the six-hour norm. Exceptions occurred for Far West, whose first grades averaged seven percent less school time, and for Kansas and High/Scope, where school days at both grade levels

were five to six percent longer than the norm. These disparities in extensity of schooling are clearly important, but they are of smaller magnitude than other resource variations. Our subsequent discussion will, therefore, focus primarily on the availability of personnel resources, since these vary most widely among the curricula and since they are most directly critical for grouping and supervision strategies. That is, we will concentrate on the intensity rather than the extensity of instruction.

2.2 Personnel Resources and Their Relation to Teaching Strategy

In a class with both a teacher and an aide, the teacher can work with a small group while the rest of the class is supervised by the aide. A teacher without additional support personnel, on the other hand, must increase pupils' unsupervised time if she desires to decrease the size of instructional groups. Thus, the effects on pupils of grouping and individualization decisions, strongly depend on the availability of supporting personnel.

Of course, these effects are also dependent on class size. The number of children in each classroom who regularly attend, along with the time commitments of adult teaching personnel, determine the normal ratio of children to adults in the classroom. This ratio is the key factor which links instructional strategy to pupil experiences.

2.2.1 Resources and Strategy: An Illustration

To flesh out these notions in a fashion which makes clear the overall interdependency of teaching strategy, resources, and pupil experiences, we have summarized some data bearing on these issues in Table 1.

Insert Table 1 about here

These data describe the circumstances of instruction in First Grade classes not implementing Follow-Through curricula, as assessed in the observational study. It should be considered, in interpreting the data presented, that the classrooms described are widely varying. They have no curricular cohesion and are only typical of the non-Follow-Through classes in districts and schools where the Follow-Through evaluation was conducted. The personnel figures in the table reflect the total time commitments of persons in each teaching category. Thus the 1.11 teachers, if it applied to a single class, could have been one full-time teacher plus a specialist who works with pupils in that classroom for eleven percent of the weekly instructional period. Formal definitions of the various indices exhibited in the table and their rationales are given in the introduction to Appendix A.III.

The teacher resources in these classes average slightly in excess of one full-time person. This is most likely due to specialists who visit the classroom and provide specific instruction for short periods of time. However, aide resources constitute only about 36 percent of a full-time equivalent. This comes about because about two-thirds of the classes have aides and, on the average, they work just over half-time. Volunteer efforts are even more severely restricted, volunteers being present only about 17 percent of the time. Again, they are, as are aides, present in only about two-thirds of the classes, while their time commitment, when they are available to pupils, is only about half that of the aides.

These personnel are used to fulfill somewhat differentiated functions. The teacher spends most (59%) of her time with large groups and about one-fourth with small groups, devoting relatively small amounts to tutorial instruction and activities which are not directly instructional. The aide spends much less of her time with large groups (29%), somewhat more than the teacher with small groups (30%) and considerably more in non-instructional activities (28%). The volunteer spends most of her time with children (88%), concentrating on individuals and pairs (34%), but also with stress on large groups (43%). All in all, adults in the classroom spend almost half of their time in large groups, one-quarter in small groups, 11 percent in tutorial or two-child settings and the rest (15%) without children.

These allocations probably flow from individual preferences and assessments about the effectiveness of teaching settings, but severe constraints on these decisions follow from restrictions on the personnel resources available. The average number of pupils enrolled in these classes is just over 26 which, given a daily absence rate of about 7 percent, means that teaching personnel deal with between 24 and 25 different pupils during a typical school day. The effective pupil/teacher ratio is, therefore, almost 15 to 1. This ratio constrains the average amounts of time which pupils spend in groups of various sizes.

2.2.2 The Determination of Pupil Experiences

Given a teaching strategy and a configuration of classroom resources, a logical question concerns the consequences for pupils: How do these factors influence pupils' educational experiences?

Suppose, for example, that in a class of 25 pupils a teacher and her aide spend 10 and 25 percent of their time, respectively, tutoring pupils. Since tutorial instruction involves only one of the 25 pupils at a time, a typical pupil will be tutored 10/25 = 0.4 percent of his time by the teacher and 25/25 = 1.0 percent of his time by the aide. As this example shows, there is a strict defining relation between the adult instructional time available in the

classroom and the grouping context within which it is used, on the one side, and the average amounts of pupil exposure to instruction in that context, on the other.

The relationships between pupil and teaching time allocations for other grouping contexts are as strict and can be generally stated for groups of all sizes. A discussion and derivation of these relations is given in Appendix A.IV. Generally, the proportionate pupil time allocation for an instructional context is equal to the product of three factors: (a) the average group size, (b) the personnel intensity ratio (full-time equivalent teaching personnel per pupil), and (c) the proportion of instructional time devoted to the context.

As group sizes and the proportion of teaching time devoted to them are determined by teaching strategy and as the personnel ratio indexes the intensity of the resources allocated, instructional strategy and resource intensity strictly determine the situational framework of the child's educational experiences.

To further illustrate this relation, suppose that in one classroom 40 percent of all adult time is spend in small groups of six children. Also suppose that the class is heavily resourced -- for this example we will assume 20 children taught by a teacher, two aides, and a volunteer -- so that the adult/child ratio is

4/20 = 0.2. Then the percentage of pupil time spent in such small groups would be (40) (6) (0.2) = 48 percent.

From these examples, it should be clear that it is not reasonable to evaluate and compare the children's experiences in various curricula without simultaneously accounting the available resources used in implementing the curricula.

Returning to the non-Follow Through classes described in Table 1, it is now clear that although tutorial instruction occupies almost 8 percent of adult time, the pupil/adult ratio of 14.8 implies that pupils will experience such instruction during less than six-tenths of one percent of their instructional experiences. Similarly, even though one quarter of adult time is devoted to small group instruction, the average group size of six pupils strictly determines that pupils will spend only about ten and one-half percent of <u>their</u> time in such groups. Also, limited resources constrain teaching personnel to use large group instruction extensively if children are not to be left on their own for most of their school day. Also in these classes, as adults spend almost half their time with large groups of pupils, the typical size of such groups must be extreme (over 17 pupils) in order to hold the average pupil time in such settings down to less than 60 percent. And even this picture leaves pupils unsupervised over 30 percent of the time.

It is also difficult to see how a revision of the teaching strategy could materially improve the situation. If one- and two-pupil settings were entirely eliminated and their time allocations added to small group instruction, unsupervised time would decrease by only about 4 percent. The resource constraints in these classrooms strongly influence pupils' educational experiences.

2.3 Resource Intensity

The values of critical resource variables are summarized for each Follow-Through curriculum in Tables 2 and 3. There is relatively little variation among curricula in number of teachers, with slightly more than one-full time equivalent teacher per classroom in all programs. High/Scope has the greatest numbers of personnel at both grade levels, and an inspection of teacher time commitments by site reveals that there were two full-time teachers supplied to each first grade classroom in one location. In the other programs, the values are closer to one, and the additional teacher time may reflect specialists who are present in the classroom only part-time.

Insert Tables 2 and 3 about here

The amount of available teaching aide time is more variable, with first grade values for specific curricula ranging from 1.06 to 1.93, and third-grade values from 1.04 to 2.25. EDC and Far West have the smallest numbers of aides at both grade levels with about one aide per classroom, and Kansas has the highest at each level typically having more than two full-time equivalent aides.

There is even more variation in the numbers of volunteers present. Far West generally had high and Oregon low levels of volunteer support but there were no other consistencies across grade levels. Generally, there were more volunteers in the first grade than the third grade classrooms. The greatest use of volunteers occurred in the Kansas curriculum at the first grade level, averaging almost one full-time equivalent volunteer per classroom. In the other curricula volunteers were present much less frequently, with some classes using no volunteers at all. The volunteer support levels seem considerably more idiosyncratic than those for either teachers or aides.

When the numbers of teachers, aides and volunteers are combined, Kansas is consistently the most heavily staffed curriculum due to its heavy use of aides and volunteers. However, the Kansas classes also have the highest enrollments, and these must be taken into account. Across all programs, average enrollments range from 21 to 28 in the first grade, and from 23 to 29 in the third. At the

first grade level, EDC and Kansas have the largest numbers of pupils per class, and Far West the lowest. In the third grade, Kansas is highest, and Far West and Arizona are the lowest.

Enrollment figures, however, are further altered by average absence rates, and these vary from one location to another. Thus, the index of personnel resources which is most appropriate for assessing the daily effects of resources on teaching strategy and children's experiences, is a child to adult ratio based on average daily attendance. This value ranges from 6.2 (Kansas) to 8.6 (EDC) at the first grade level and from 7.7 (Kansas and High/Scope) to 9.9 (EDC) at the third.

If the programs are grouped, they fall into three identical clusters at each grade level. Kansas, High/Scope, and Far West are most heavily resourced (low pupil/adult ratios), Arizona, Bank St., and Oregon have moderate levels, and EDC has consistently low resources.

In some instances it is difficult to know whether these cross-grade resource consistencies reflect school district resource constraints or real program characteristics. The sites for each curriculum are identical for each grade level but also, there are curricular resource specifications. For example, the Kansas program outline clearly defines roles for a teacher, two para-professional aides, and several parent volunteers, and the

observed resource levels are consistent with these specifications. Similar specifications may be operating for other curricula. The programs emphasizing small classes, for example, may have set an enrollment ceiling as a precondition of implementation. Since these constraints make program operation more expensive, sites which could not provide adequate resources might not have chosen to implement a particular curriculum.

The particular curricular and site characteristics which determined observed resource levels for the Follow-Through curricula cannot be easily identified or separated. However, the importance of the resource levels lies in their potential effects on teaching strategy. We can talk in general terms, and will in the next section, of the teaching strategies used in various curricula. However, in order to fully understand how and why these strategies were implemented, and to draw out their implications for pupil experiences, we must consider their resource context.

2.4 The Comparison of Teaching Strategies: An Example

As teaching is a goal-oriented activity and since such goals at least partially determine the desired amount of time pupils will devote to various instructional activities, decisions concerning teaching strategy are likely influenced by their perceived effects

on pupil experiences. And as personnel resources available for instructional activities constrain and moderate the effects of such strategies on pupil time allocation, these resources must be accounted if curricular comparisons of either teaching strategies or pupil experiences are not to be extremely misleading.

As we have seen in the earlier section, aggregate personnel resources varied considerably from one curriculum to another, ranging from EDC at the low extreme (8.6 pupils per adult in the first grade) to Kansas at the other (6.2 pupils per adult in the first grade). Typical intermediate values for First Grade classes were 7.0 (Far West) and 8.0 (Bank St.). This resource variation is extremely wide as the amount of adult time per pupil for a typical Kansas classroom is 38 percent greater than that in an EDC class.

But we must not only account resource intensity. The context within which the resources are used is also important. For example, if we try to compare the EDC and the Kansas curricula, we find that all of EDC sites are more poorly resourced than any of the Kansas sites. EDC resource intensities range from 7.7 to 10.5 pupils per adult while Kansas intensities range from 5.2 to 7.7. Only two sites may be paired in terms of overall intensity. However, the teaching contexts which produce these values are considerably different. The Kansas site has an intensity of 7.7 because its average

attendance is about 26 pupils and it has about 3.4 full-time equivalent adults in the classroom, while the EDC site has an attendance of less than 20 pupils and only 2.5 adults in the classroom. This contextual discrepancy allows different opportunities for classroom teaching strategy even though the resource intensity levels are identical. For example, a teacher at the Kansas site could allocate class time to group sizes above 20, while this option is not available in the EDC classroom at the corresponding site.

This particular Kansas site is generally comparable, however, to the sites of several other curricula. One of the closest of such comparisons is possible with a Bank Street site. Table 4 displays basic resource and teaching strategy data for the two sites. Each display summarizes data for four classrooms. Again each site has a resource intensity of about 7.7 pupils per adult. In this comparison, however, the classroom contexts are similar: 25 attending pupils for the Bank St. site vs 26 for Kansas. Even the personnel composition is parallel: one full-time teacher plus about two aides and only minor volunteer support. Consequently we will be able to focus mainly on total adult time allocations in assessing differences in

---

Insert Table 4 about here

---

teaching strategies. This is also useful because the average number of occurances of volunteer participation was too small (averaging only 5 or 6 events per classroom over the entire observation period) to stably estimate time allocations. In passing, we also note that the relation between teacher and aide allocations, within a curricular approach, is consistent with our earlier generalizations, i.e., they are parallel except that aides spend less time than teachers in large group instruction and correspondingly more time without pupils. As this tendency is constant for both curricula and as teacher and aide time allocations are otherwise consistent within an approach, adult time allocations provide valid comparisons of teaching strategy.

Given this background, it is apparent from the summary adult time allocations that there is a considerable difference in teaching strategy between these Kansas and Bank St. sites. These Bank Street teaching personnel spend more than 9 percent of their time working with one or two children versus only about 3 percent for Kansas. Small group instruction at the Kansas site is much more greatly emphasized, in terms of adult time, than at the Bank Street site (63% vs. 38% of total instructional time). The emphasis on large group instruction is about the same, so the differential is accounted by the amount of time spent without children. The Bank Street adults spend 2.4 fold more time without children than those at the Kansas site.

Because of the varying sizes of the small groups used at the sites, these adult allocations result in children spending more than half their time in small groups (54%) at the Kansas site, while those in the Bank Street classes spend less than a quarter of their time in these grouping contexts. Concomitantly, Bank Street pupils at this site spend more than 31 percent of their time unsupervised while only about 6 percent of Kansas pupils' time is so spent.

3. Teaching Strategy: Interpretations

Compensatory education curricula are intended to provide additional educational opportunities for disadvantaged children. To achieve this goal, educational resources are augmented and new educational programs are mounted. In supplementing existing classroom resources to increase the effectiveness of schooling, the extensity of schooling can be increased -- through additions to instructional time -- or schooling can be intensified -- through increased instructional support within a defined duration. Most frequently, intensification has defined the course followed.

But such educational efforts also involve the development and implementation of new educational concepts through curricular preparation and revision. And there are considerable variations in viewpoint about such concepts. Thus, the seven Follow-Through curricula are based on distinct perspectives about pupil experiences and their goals, and about the kind and degree of specification of these experiences desirable or needed for implementation. In this section we will first give an overview of these issues which will allow us to form some expectations concerning variations in teaching strategy.

Subsequently, we will detail variations in teaching strategy for the various curricula, and interpret them using the resource and curricular concepts we have explored.

3.1 Curricular Issues

Curricular Goals. Two of the curricula, Oregon and High/Scope, have primarily cognitive goals. One, Oregon, is designed for teaching specific concepts and skills, while High/Scope focusses on cognitive processes rather than specific concepts. In contrast, the other programs are described as incorporating both "cognitive" and "affective" goals. The Kansas descriptive material specifies an emphasis on basic academic skills and social skills; that for the Arizona curriculum discusses intellectual and motivational objectives, and the remaining programs (Bank Street, Far West, EDC) specify similar breadths of intent. In the curricula with a heavy cognitive orientation, groupings and supervision strategies might be expected to maximize intellectual achievement at the expense of peer interation and communication. In those which have a broader focus, teaching strategies may be adapted to provide experiences which address social goals. Group work may then be valued for the social experience it provides, and peer

tutoring could be used to develop interpersonal skills. Two of the programs (EDC and Far West) also stress self-direction and independence in learning among their goals. In these curricula unsupervised independent work was perhaps expected to play an important role.

Pupil Experiences. The Follow-Through curricula also prescribe different kinds of pupil experiences, either because of goal differences or because of different notions about the social and psychological requirements for reaching goals of specific types. The Oregon and Kansas programs are based on principles which stress the specificity and appropriateness of instructional communications and the importance of systematic reinforcement of desired behavior. We would expect adult supervision to be critical in these programs, since feedback must be frequently and consistently given. The High/Scope program is based on Piagetian developmental theory, and emphasizes active experience with particular materials and situations. The other programs have more eclectic bases. They tend toward an "open education" perspective, with an emphasis on students' active involvements in their environment, and non-directive roles for adults in their classroom. We might expect less supervised instruction in these programs, since teacher direction is believed to play less of a role in students' learnings.

Curricular Specification. The Follow-Through programs are also distinct with respect to the amount of guidance provided by the curriculum or its handbooks and training materials. At one extreme are the most highly specified programs, Kansas and Oregon. Specific objectives and teaching methods are prescribed, and children have relatively little choice in their learning activities. The High/Scope program is intermediate in specification; there are specific goals, and materials and teaching strategies are prescribed, but students are allowed considerable choice in their daily activities. The remaining programs are less specified, leaving many of the details of teaching strategy up to the individual teacher. The EDC program, which is the least prescriptive of all, provides no definite program specifications at all, but simply describes the resources which communities need to implement open education programs. The degree of guidance given by a particular curriculum certainly will affect the consistency with which it is implemented. Presumably, less specified programs should encourage decisions closer to ordinary classroom norms than those which give more specific guidance.

3.2 Grouping and Individualization Strategies: Illustrations from Follow Through

"Teaching strategy" refers to the way that classroom instruction is organized. And as we have seen, variations in the sizes of instructional groups, the frequency with which they are used, and the amount and kind of supervision provided create important differences in the instruction that pupils receive. Compensatory education classes, in particular, being provided with significantly greater resources than regular classes, have open to them a wide range of instructional alternatives. In addition to one or more teachers, aides and volunteers must be coordinated, and opportunities, not usually available, exist for differentiating teaching functions.

The Follow-Through observation data provide a unique perspective on how these decisions are handled. They allow explication of the grouping and individualization strategies used in the implementation of the several curricula with simultaneous accounting of the personnel resources used. Appendix A.III contains the basic data used to explore these strategic variations. These data will also be summarily presented below as we describe and interpret these variations.

3.2.1 Follow-Through Classes: An Overview

As expected, all teaching personnel spend the majority of their school time giving direct instruction to pupils, independently of the resources available (Table 5). However, there exists wide variability among personnel in the amounts of time actively spent with or without pupils.

Insert Table 5 about here

Time spent without pupils is used for administrative purposes, for preparing materials, grading, lesson planning, etc. We would hope that the teacher who is best prepared for instruction would spend less time without pupils than either aides or volunteers, either of whom could easily take on parts of a teacher's administrative burden (attendance, grading, collecting school fees) and also greatly assist in material and lesson preparation. And actually the Follow-Through data base confirms this prospect. Teachers average more time directly instructing pupils than aides and volunteers, both in the classes implementing Follow-Through curricula and comparable classes without specific curriculum orientations.

They tend to spend only between eight and thirteen percent of their pupils' school day without giving direct instruction to those pupils. Interestingly, in the more resourced Follow-Through classes, teachers tend to spend slightly more time without pupils than in the comparison classes. Obviously, the increase in personnel is not, as might be expected, used to free the teacher for more direct instruction but instead other personnel are used to relieve the teacher from direct teaching. However, this is only the case to a slight degree, as teachers in first grade Follow-Through classes, on the average, spend merely 3.4 percent more time without pupils and the difference for third grade is only 1.4 percent.

Definitely aides and volunteers spend considerably more school time than teachers performing tasks which do not involve instructing pupils. This holds especially for aides. Presumably, they have appropriate amounts of training to prepare materials on their own. On the other hand, volunteers typically do not have relevant training and are thus more efficiently employed in tutorial work. Accordingly, they spend less time,relatively, without pupils than aides. The large range, 12 to 24 percent, indicates that their work patterns are more diverse than either those of teachers or aides. Both aides and volunteers spend considerably less time than teachers with large groups. Presumably, larger groups are considered more difficult to teach.

The personnel allocation to direct pupil instruction reveals characteristic uses. As we have indicated, teachers give more large-group (more than 8 pupils) instruction than other personnel, but with enormous variation. In the first grade Follow-Through programs, teachers spend, on the average, 30 percent of their classroom time with large groups. This amount increases to about 36 percent in third grade. In the comparison classes, however, first grade teachers devote 59 percent of their time in large groups, and this increases to 65 percent in third grade. I.e., teachers in comparison classes devote about twice as much time as Follow-Through program teachers to large group instruction. This difference results, in some degree, from the poorer personnel resource situations in comparison classes. But also teacher strategies play an important role.

The Follow-Through classes have a substantial focus on small group instruction. Also notable is the seemingly differentiated use of teachers in tutorial situations. Typical teachers in the Follow-Through classes devote slightly more time to tutorial instruction than either their aides or comparison class teachers. Perhaps, teachers are consciously used for specific learning problems while aides and also volunteers provide more general tutorial help to pupils.

Aides in Follow-Through classes are mainly used for small group instruction in addition to material preparation or administrative tasks. This is not the case for the comparison classes. Here, we found that aides in first grade spend about equal amounts of time in small and large group instruction and in work not directly involving pupils. However, in the third grade, aides' work is focussed on tutorial instruction and presumably offers help in both learning problems and individualizing the curriculum for special interests and abilities.

Again, the volunteer remains the maid-of-all-trades. And this is understandable for two reasons. Volunteers presumably vary widely in their education and school-relevant skills, and they typically spend less total time in classrooms and are less regular in their participation than either teachers or aides. They form, therefore, a smaller part of a teacher's planning and they demand special consideration for effective employment.

3.2.2 Small Group and Tutorial Instruction

Small Group (3 to 8 children) instruction is clearly a favored grouping alternative in the heavily resourced Follow-Through classes. Typical classes for some of the curricula devote the majority

of teaching time to small instructional groups. But the curricula differ quite systematically in their use of this setting (Table 6).

Insert Table 6 about here

In most programs, aides spend slightly more time than teachers in small groups; however, in contrast to their responsibilities for other group settings and for non-instructional work, teacher and aide roles in small group instruction seem to be quite similar. In general, both types of teaching personnel spend about the same amount of time in small groups. The degree of emphasis on small group work is also consistent across grade levels. Only the Oregon curriculum shifts emphasis substantially across grade levels.

Teachers and aides also spend time working with one or two pupils. Again, curricula vary considerably in the amounts of tutorial instruction given (Table 7). For example, in the Kansas program, teaching staff spend only about five percent of their time with one or two pupils. At the other end of the distribution, the Far West program shows the greatest use of these settings, adults spending considerably more time (27 to 33%) at both grade levels. EDC teaching personnel also spend large amounts of time in these settings.

Insert Table 7 about here

Volunteers' time allocations to small group settings are quite variable, and show few consistent patterns across grade levels. This may be due to the fact that the curricula varied considerably in the extent to which volunteers were available (See Tables 2 and 3).

Kansas and Far West, use their volunteers in ways that parallel the activities of their teachers and aides. Far West volunteers spend about 15 percent of their time in small groups, less than the volunteers in any other programs. Teachers and aides in this curriculum spend about 25 percent of their time in small groups, also at the low end of the range. Kansas teachers and aides spend the greatest amount of their time (over 50%) in small groups. And Kansas volunteers spend almost 30 percent of their time in small groups, about twice as much time as Far West volunteers.

Over all programs, volunteers typically spend the largest part of their time with one or two pupils. Time allocations to these settings range from 16 to 53 percent. In all curricula, volunteers spend more time in these settings than teachers and aides do. Tutorial instruction seems to be a consistent and major part of the volunteer's instructional role.

In the Far West curriculum, where the tutorial setting is the most heavily used by teachers and aides, the volunteers also spend more time than those in other programs. Kansas classes, where tutorial settings are almost never used by teachers and aides, accomplish almost all tutoring through volunteers. A comparison of the Kansas and Far West programs pinpoints distinct patterns of teaching responsibility. The Far West curriculum differentiates little between teachers, aides, and volunteers in their group duties. The Kansas volunteer role is much more clearly differentiated from that of the teacher and aide. Volunteers are apparently used to compensate for extreme teacher and aide emphasis on small groups.

The key fact about instructional time devoted to small groups and tutoring is its resource dependency. As personnel resources increase there is a direct increase in the amounts of time instructional personnel devote to individuals or groups of less than nine children. Empirically the relation is a strong one. Kansas and High/Scope, the most heavily resourced curricula, each devote close to seventy percent of their instruction to these settings, while Bank Street, Oregon and EDC, the least resourced of the Follow-Through curricula spend a total of only about fifty percent in these ways. The comparison classes, most sparsely resourced of all, devote only about thirty percent of their time to these settings.

Clearly, most instructional rationales do not systematically emphasize the less intensive settings. Resources are always used to intensify instruction by reducing the numbers of pupils taught together.

However, the choice between small groups and tutorial settings seems not to have a strong resource component. As we have noted the curricular variations in these decisions are substantial, but empirically they do not relate to resource levels. These differences are likely to be majorly determined by the curriculum itself.

3.2.3 Time Spent Without Pupils and With Large Groups

The percentage of teaching time which is not devoted to direct instruction varies systematically and greatly among curricula (Table 8). At the low end, EDC teachers spend from 2-(first grade) to 3-(third grade) fold more time without pupils than those instructing in the Kansas curriculum. Aide time allocations to activities which do not involve pupils are consistent with those of teachers, but even more extreme, EDC aides having 2½ to 3½ times more involvement in these tasks than their Kansas counterparts.

Insert Table 8 about here

Clearly, the Kansas program places a high priority on spending time in direct interaction with pupils. This emphasis is consistent with the program's behavior analysis model, which prescribes specific learning activities and frequent reinforcement of desired behavior. The EDC approach is obviously quite different, although we don't know what the EDC teachers and aides are doing during the times not devoted to direct instruction. The program is based on an open education perspective which stresses the importance of children's independent interaction with their environment. Because of this emphasis, the teaching personnel in this program may be encouraged to devote relatively large portions of their time to collecting, preparing, and arranging materials and other elements of the classroom environment. This interpretation assumes that the time allocation data reflect the intended consequences of a well-implemented program. It is also possible that the relatively large amount of time spent on non-instructional tasks is an unintended outcome, resulting from factors such as the lack of prepared materials or the absence of specific and detailed guidelines concerning the utilization of increased personnel resources.

One problem with these interpretations is that they do not fully take account of resource differences among curricula. The Kansas-implementing school districts have much greater resources per pupil

than those implementing the EDC perspective. However, if we compare the EDC with the comparison classes, which have about half of EDC resource levels, we see that fewer resources force teachers to spend about the same small amount of time without children as Kansas teachers. With few supplementary personnel, this must be done to keep pupils' unsupervised time within bounds (See Section 2.2). The additional Kansas resources are used in a fashion which cuts unsupervised time to very low levels by using the extra teaching time for instruction while EDC permits relatively high levels of non-supervision by allowing or encouraging increases in non-interactive activities.

Teacher and aide roles are clearly differentiated with respect to time spent in large group instructional settings (Table 9). Aides spend considerably less time than teachers in this setting, probably reflecting the instructional complexity of large groups. In the first grade, aides spend a uniformly low percentage of time. At the third grade level, five of the seven programs remain near this range, but the allocations for Kansas and Oregon aides increase to about twenty percent. Large group allocations for teachers are uniformly higher, ranging from about twenty to fifty percent.

Insert Table 9 about here

Clearly, the additional availability of personnel resources results in the reduction of large group instruction, increasing time allocations to small-sized groups. The most dramatic illustration of this is the constrast between the comparison classes, 50 percent time or more devoted to large groups, and the Follow-Through classes generally, which average less than 25 percent of instruction time in large groups. The corresponding resource discrepancy among these groups is about two to one.

3.3 Instructional Roles: A Summary

Teachers spend the majority of their time involved in direct instruction. Most of this instructional time is spent in groups and more teacher than aide or volunteer time is spent in large groups (Figure 1). There is considerable variation in the size of the groups involved, but teachers who spend the most time working in small groups spend the least in large ones. Tutorial instruction and non-instructional tasks occupy a relatively small portion of most teachers' time.

Aides spend a considerable amount of their time in activities which do not involve direct contact with children. They spend about the same amount of time as teachers in small group and tutorial

activities, but they are involved less often than teachers in large group work. Thus, they divide most of their time between small group and tutorial or non-instructional work. Volunteers spend the major part of their time in tutorial settings.

Insert Figure 1 about here

Teachers, who have the most responsibility and the most training, spend more time interacting with children than either aides or volunteers. They also work with larger groups. Volunteers, with minimal training and experience, work primarily with one or two students, and aides assume an intermediate role, working primarily with small groups of students.

Volunteers have the most variable teaching role. For example, descriptions of the Far West and Kansas curricula include the volunteer as a member of the teaching team, and their consistent use of volunteers reflects this. In other program descriptions, no mention is made of volunteers. With little or no curricular guidance, it is not surprising that these programs exhibit considerable variation in the ways that volunteers are used.

3.4 Grouping and Individualization: A Display

Curricular perspective and resources are major determinants of the ways that classrooms are organized. Such classroom processes, in Follow-Through and comparison classes, have been highlighted by the examination of time spent by classroom personnel in various instructional settings. By exhibiting these time allocations simultaneously, we can display for each curriculum, the particular pattern in which personnel resources were used (Figure 2). We term these patterns grouping and individualization strategies.

Insert Figure 2 about here

The resource contrasts we have identified are strongly displayed in these strategy displays. Clearly High/Scope and Kansas devote small amounts of time to large groups and non-instructional tasks. On the other hand, instruction in the comparison classes takesplace predominantly in large groups. But also differences among curricula in their emphasis on tutorial and small group instruction are strikingly displayed. Three of the programs - EDC, Far West and Bank Street - are quite similar, and distribute personnel time fairly evenly among the four settings. Three other programs -

High/Scope, Kansas, and Oregon - show a clear preference for the small group setting, primarily at the expense of tutorial instruction. Arizona is intermediate between these extremes. An inspection of the specific personnel time allocations for Arizona indicates its teacher allocations are similar to those of EDC, Far West, and Bank Street, and that the total emphasis on small group instruction is a specific result of aide time allocated to this setting.

Thus, these displays exhibit the actual differences in teaching strategy among the curricula as implemented. They reflect, as do the strategies themselves, curricular priorities and resources. Resources, therefore, must be accounted before it is possible to comprehend either the causes or the consequences of grouping and individualization.

4. Curricula, Resources, and Strategies: Some Conclusions

Our analyses have been devoted to shedding light on the intensity aspect of schooling without tracing its consequences through to pupil acquisition. These analyses were restricted to only one aspect of resource allocation: personnel. This, however, is the most costly resource component, as between 80 and 85 percent of total educational resources are bound to personnel.

We found tremendous variation in amounts of personnel resources. Classes participating in the Follow-Through planned variation had one and one-half to three times the resources of comparable, non-participating classes. And the minimal evidence available indicates that these comparision classes have the more typical resource levels for American elementary schools.

But we also found large (two to one) personnel resource differences among the Follow-Through curricula. One likely inference is that a self-selection process took place during the phase when districts, schools, and teachers agreed to participate. Certain curricula demanded considerably more resources than others in that they emphasized small group sizes and/or considerable individualized, supervised instruction. Other curricula were less focussed on issues of grouping and individualization or were more generally less clearly specified. This would imply that curricular selection is

related to resource availability. That is, only the more affluent districts could afford to adopt curricula which prescribed extensive and supervised small group or individualized instruction (Far West, Kansas). Thus curricula requiring higher intensity of schooling would be more likely implemented in better resourced districts.

In the introduction we asked whether teachers tend to employ similar grouping and individualization strategies in similar personnel resource situations. Our comparative illustration indicates that this is not the case. Similarly resourced classes still varied considerably in grouping sizes and in the extensiveness of individual work. These variations result in remarkable differences in e.g., the amount of time that pupils spend without direct supervision.

Our illustrations also suggest that grouping and individualization differences among teachers are not solely outgrowths of teachers' strategies in a methodological sense, i.e., strategies as curriculum-independent vehicles or tools. Instead, these differences in grouping and individualization are strongly dependent on the curriculum.

Teaching strategies and curricular content or goals are often, not always, heavily intertwined in that certain goals and contents very nearly require specific strategies and in that strategies may be strongly goal-related in a content sense, i.e., they may have important educational impacts per se. The Follow-Through curricula

exemplify these points clearly. Those curricula which stress independence, free choice, and self-direction, emphasize unsupervised work and tutoring while those with strong "academic" skill emphasis leave little time for individual work and focus on group instruction, especially small groups when resources levels allow.

The other intensity aspect of schooling that we pulled to the front stage, is the use of different types of personnel: teachers, aides, volunteers. In a self-contained, single teacher classroom, this is not at issue. The teacher gives whole class instruction and if she decides to group, then pupils in some group(s) have to work on their own while the teacher gives instruction to other groups. As soon as other personnel are available, the teacher is confronted with a new managerial task. Personnel have to be assigned to groups and individuals, and administative tasks can be divided among the personnel. But how is that to be done most effectively, considering the resources and skills levels available and the pupils' characteristics?

Our data indicate that the small group and individual work of aides generally follows the same pattern as that of teachers. Aides as well as teachers engage in large group instruction, but they devote considerably less time to it and correspondingly more time to work which does not involve pupils, i.e., material preparation, grading, administrative tasks, attendance recording. So presumably, aides take over some of every task from the teachers. But, it is not the case

that aides are used to free the teacher for more direct pupil instruction.

Nor are volunteers used for this purpose. We mentioned earlier that volunteers vary widely in skill patterns and regularity of availability. But as are aides, volunteers are used in all grouping settings, although with less consistency over classrooms than aides. Primarily however, they are used in tutorial settings.

In essence, all personnel are used in all settings with increasing emphasis on smaller-sized groups as levels of training diminish, aides and volunteers also spending more time without pupils than teachers. Curricula do strongly influence the pattern, however, with some curricula strongly differentiating instructional roles (Arizona) and others not (Kansas).

How different are the instructional skills of teachers, aides, and volunteers? Do experience and training give teachers greater skill in handling larger groups? Can training experiences overcome this or are they generally irrelevant for instructing groups of differing sizes and instead only apply to the content of teaching? We wonder. Do the training experiences of some curricula overcome initial differences in group-teaching skills or should we assume that in the absence of knowledge about differential skills of teaching personnel and their effectiveness in various pupil grouping settings, teachers and

developers of curricula follow the path of least resistance, i.e., they pattern instructional guidelines after teachers' techniques which are common but not necessarily very effective?

It is high time to investigate this question. If we staff typical-size classrooms with up to four full-time instructional adults then we better find out how to use them most effectively, as the educational costs are surely high. Of course, we cannot simply look at the allocation of personnel to and within grouping and individualization patterns.

In order to assess school effectiveness, it is mandatory to take account of the curricular approach, goals, time allocations, grouping and individualization strategies, and teaching and supervisory personnel. Curricular goals are necessary in evaluating pupil outcome assessments; time allocations represent the extensity of teaching; grouping and individualization strategies and instructional personnel represent the intensity aspect of the teaching-learning process. Both, intensity and extensity of the teaching-learning process are paramount factors for resource allocation.

References

Bloom, B. S. — Human Characteristics and School Learning. New York: McGraw-Hill, 1976.

Carroll, J.B. — The Prediction of Success in Intensive Foreign Language Training. In: Glaser, R. (Ed.), Training Research and Education. Pittsburgh: University of Pittsburgh Press, 1962. Ch. 4.

Carroll, J.B. — A Model for School Learning. Teachers College Record, 64, 1963, 723-733.

Harnischfeger, A. and Wiley, D. E. — Teaching-Learning Processes in Elementary School: A Synoptic View. Studies of Educative Processes, No. 9, University of Chicago, 1975. Also in Curriculum Inquiry, 6, 1976, 5-43, and in: Erickson, D. A. (Ed.), Readings in educational research: Educational organization and administration. American Educational Research Association. San Francisco: McCutchan, 1976, 195-236.

Harnischfeger, A. and Wiley, D. E. — Conceptual Issues in Models of School Learning. Studies of Educative Processes, No. 10, CEMREL, Inc., (in preparation).

Stallings, J. A. and Kaskowitz, D. H. — Follow-Through Classroom Observation Evaluation -- 1972/73. Menlo Park, Ca.: Stanford Research Institute, 1974.

Stanford Research Institute — Annex to Follow-Through Classroom Observation Report -- 1972/73, August, 1974.

Table 1. Personnel Resources and Time Distributions to Groupings for Comparison Classes (First Grade)

	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	8.1	28.3	12.5	14.6	30.8	
Tutorial with 1 Pupil	7.1	8.8	17.4	7.8	0.6	
Tutorial with 2 Pupils	2.1	3.9	16.3	3.5	0.5	
Group size 3-8	23.7	29.8	10.8	24.8	10.6	6.30
Group size > 8	59.0	29.2	43.1	49.2	57.5	17.33
Percentage of Classes with Personnel	100.0	65.7	68.6			
Number of Full-Time Equivalents in Classes with Personnel	1.11	0.55	0.26			
Number of Full-Time Equivalent Personnel	1.11	0.36	0.17	1.64		

Number of Pupils = 24.4

Child/Adult Ratio = 14.8

See also Appendix A.III, Table A.8.

Table 2. Resource Profiles for Follow-Through Curricula (First Grade)

Curriculum	Full-Time Equivalent Personnel				Percentage of Classes with Volunteers	Average Enrollment	Average Attendance	Pupil/Adult Ratio
	Teachers	Aides	Volunteers	Total Adults				
EDC	1.15	1.06	0.75	2.96	100.0	28.3	25.3	8.57
Arizona	1.11	1.14	0.36	2.61	82.6	23.2	21.2	8.14
Far West	1.02	1.12	0.63	2.77	90.0	21.0	19.3	6.96
Bank Street	1.08	1.48	0.19	2.75	73.7	24.5	22.1	8.04
High/Scope	1.23	1.47	0.37	3.06	66.7	23.4	21.0	6.85
Kansas	1.10	1.93	1.00	4.03	100.0	28.1	25.0	6.20
Oregon	1.08	1.62	0.08	2.78	73.7	24.0	22.3	8.04
Comparison Classes	1.11	0.36	0.17	1.64	68.6	26.1	24.3	14.82

Table 3. Resource Profiles for Follow-Through Curricula (Third Grade)

Curriculum	Full-time Equivalent Personnel: Teachers	Aides	Volunteers	Total Adults	Percentage of Classes with Volunteers	Average Enrollment	Average Attendance	Pupil/Adult Ratio
EDC	1.11	1.05	0.26	2.42	76.5	26.0	24.3	9.92
Arizona	1.18	1.14	0.33	2.65	87.5	23.2	21.5	8.14
Far West	1.20	1.04	0.56	2.79	100.0	23.5	22.4	8.02
Bank Street	1.08	1.16	0.22	2.46	63.2	24.7	23.2	9.44
High/Scope	1.21	1.44	0.37	3.02	84.2	25.8	23.4	7.74
Kansas	1.03	2.25	0.28	3.55	94.1	29.2	27.2	7.67
Oregon	1.06	1.12	0.16	2.34	84.2	26.1	22.4	9.56
Comparison Classes	1.09	0.26	0.26	1.60	75.0	27.3	25.3	15.78

Table 4. Teaching Strategies of Bank Street and Kansas Classes in Resource-Comparable Sites (First Grade)

Bank Street-Site 6	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	18.0	38.8	8.8	30.1	31.4	
Tutorial with 1 Pupil	4.6	4.7	26.3	5.6	0.7	
Tutorial with 2 Pupils	3.8	4.1	3.0	3.9	1.0	
Group Size 3-8	38.4	38.6	38.9	38.0	24.8	5.0
Group Size > 8	35.2	13.8	23.0	22.4	42.0	14.4
Full-Time Equivalent Personnel	1.20	1.94	0.10	3.25		

Number of Pupils Present = 24.97 Enrollment = 28.00

Pupil/Adult Ratio = 7.68 Class Duration = 6.50

Kansas-Site 6	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	7.6	15.1	5.0	12.4	6.3	
Tutorial with 1 Pupil	0.4	0.6	40.0	2.5	0.3	1.0
Tutorial with 2 Pupils	0.0	1.0	0.0	0.6	0.2	2.1
Group Size 3-8	55.3	68.5	0.0	62.6	54.1	6.7
Group Size > 8	36.6	14.9	55.0	21.8	39.1	13.8
Full-Time Equivalent Personnel	1.00	2.29	0.08	3.37		

Number of Pupils Present = 26.01 Enrollment = 28.25

Pupil/Adult Ratio = 7.72 Class Duration = 6.50

Table 5. Time Distributions for Instructional Personnel (Percentage of Time Teachers, Aides and Volunteers Spend in Instructional Groupings)

	First Grade				Third Grade			
	Teachers	Aides	Volunteers	Adults	Teachers	Aides	Volunteers	Adults
Follow-Through Classes *								
Time without Pupils	12.5	30.4	19.2	22.0	13.3	30.1	23.9	21.7
Tutorial (1 or 2 Pupils)	15.0	13.7	32.2	15.8	13.1	12.0	37.4	14.1
Group Size 3-8	42.4	45.3	28.3	43.4	38.0	42.8	23.0	39.8
Group Size > 8	30.1	10.6	20.2	18.8	35.6	15.1	15.7	24.3
Comparison Classes								
Time without Pupils	8.1	28.3	12.5	14.6	11.9	22.1	22.9	17.8
Tutorial (1 or 2 Pupils)	9.1	12.6	33.6	11.4	9.8	40.4	32.4	13.4
Group Size 3-8	23.7	29.8	10.8	24.8	13.0	17.4	17.9	13.8
Group Size > 8	59.0	29.2	43.1	49.2	65.3	20.1	26.8	55.1

* Unweighted averages of means for the Follow-Through Curricula.

Table 6. Percentage of Time Teachers, Aides, and Volunteers Spend in Small Group Instruction (3-8 Pupils) by Curriculum

	First Grade				Third Grade			
	Teachers	Aides	Volunteers	Adults	Teachers	Aides	Volunteers	Adults
EDC	26.9	18.0	35.9	24.6	32.2	29.1	15.1	30.0
Arizona	38.1	51.6	32.1	44.9	44.3	56.6	38.3	49.8
Far West	25.6	27.1	16.8	24.2	23.5	27.2	13.8	23.1
Bank Street	34.7	40.6	21.4	37.7	34.4	40.6	25.3	37.8
High/Scope	56.3	53.2	39.3	52.8	50.9	48.8	31.6	50.2
Kansas	62.7	70.6	28.9	65.7	52.2	63.5	28.5	58.4
Oregon	52.5	56.0	23.4	53.8	28.5	34.0	7.9	29.7
Comparison Classes	23.7	29.8	10.8	24.8	13.0	17.4	17.9	13.8

Table 7. Percentage of Time Teachers, Aides, and Volunteers Spend with One or Two Pupils by Curriculum

	First Grade				Third Grade			
	Teachers	Aides	Volunteers	Adults	Teachers	Aides	Volunteers	Adults
EDC	21.8	19.6	30.7	21.6	18.6	14.1	53.4	18.2
Arizona	20.8	9.4	35.2	15.4	12.1	9.8	29.1	12.2
Far West	24.7	34.5	46.4	33.4	25.5	22.2	44.5	27.2
Bank Street	16.8	11.8	35.4	15.2	13.6	12.6	16.5	12.8
High/Scope	13.6	12.7	15.7	13.9	11.5	14.3	45.8	15.2
Kansas	2.7	3.0	34.6	5.6	2.5	2.5	36.5	4.2
Oregon	4.6	5.0	27.8	5.4	7.5	8.3	35.6	9.2
Comparison Classes	9.1	12.6	33.6	11.4	9.8	40.4	32.4	13.4

Table 8. Percentage of Time Teachers, Aides, and Volunteers Spend Without Pupils by Curriculum

	First Grade				Third Grade			
	Teachers	Aides	Volunteers	Adults	Teachers	Aides	Volunteers	Adults
EDC	18.1	48.9	16.8	30.7	19.7	40.4	13.2	30.6
Arizona	13.3	33.0	16.1	22.8	13.6	27.3	16.2	19.9
Far West	13.3	28.8	20.0	21.4	15.7	39.0	26.6	26.7
Bank Street	13.8	36.3	27.4	26.8	9.4	29.9	49.3	20.4
High/Scope	9.0	24.8	18.3	18.0	10.4	24.3	6.9	16.3
Kansas	10.6	14.4	19.2	14.6	6.9	14.2	21.2	12.0
Oregon	9.1	26.5	17.0	19.4	17.3	35.8	34.0	26.2
Comparison Classes	8.1	28.3	12.5	14.6	11.9	22.1	22.9	17.8

Table 9. Percentage of Time Teachers, Aides, and Volunteers Spend in Large Group Instruction (Pupils > 8) by Curriculum

	First Grade				Third Grade			
	Teachers	Aides	Volunteers	Adults	Teachers	Aides	Volunteers	Adults
EDC	33.2	13.4	16.5	23.2	29.5	16.4	17.6	21.2
Arizona	27.8	6.0	16.6	16.8	30.0	6.4	16.4	18.1
Far West	36.3	9.7	16.9	21.0	35.3	11.6	15.2	23.0
Bank Street	34.8	11.3	15.8	20.2	42.5	16.9	8.9	29.0
High/Scope	21.2	9.4	26.6	15.2	27.3	12.6	15.7	18.4
Kansas	24.0	12.0	17.4	14.2	38.3	19.9	13.9	25.4
Oregon	33.7	12.4	31.8	21.3	46.7	21.9	22.4	34.9
Comparison Classes	59.0	29.2	43.1	49.2	65.3	20.1	26.8	55.1

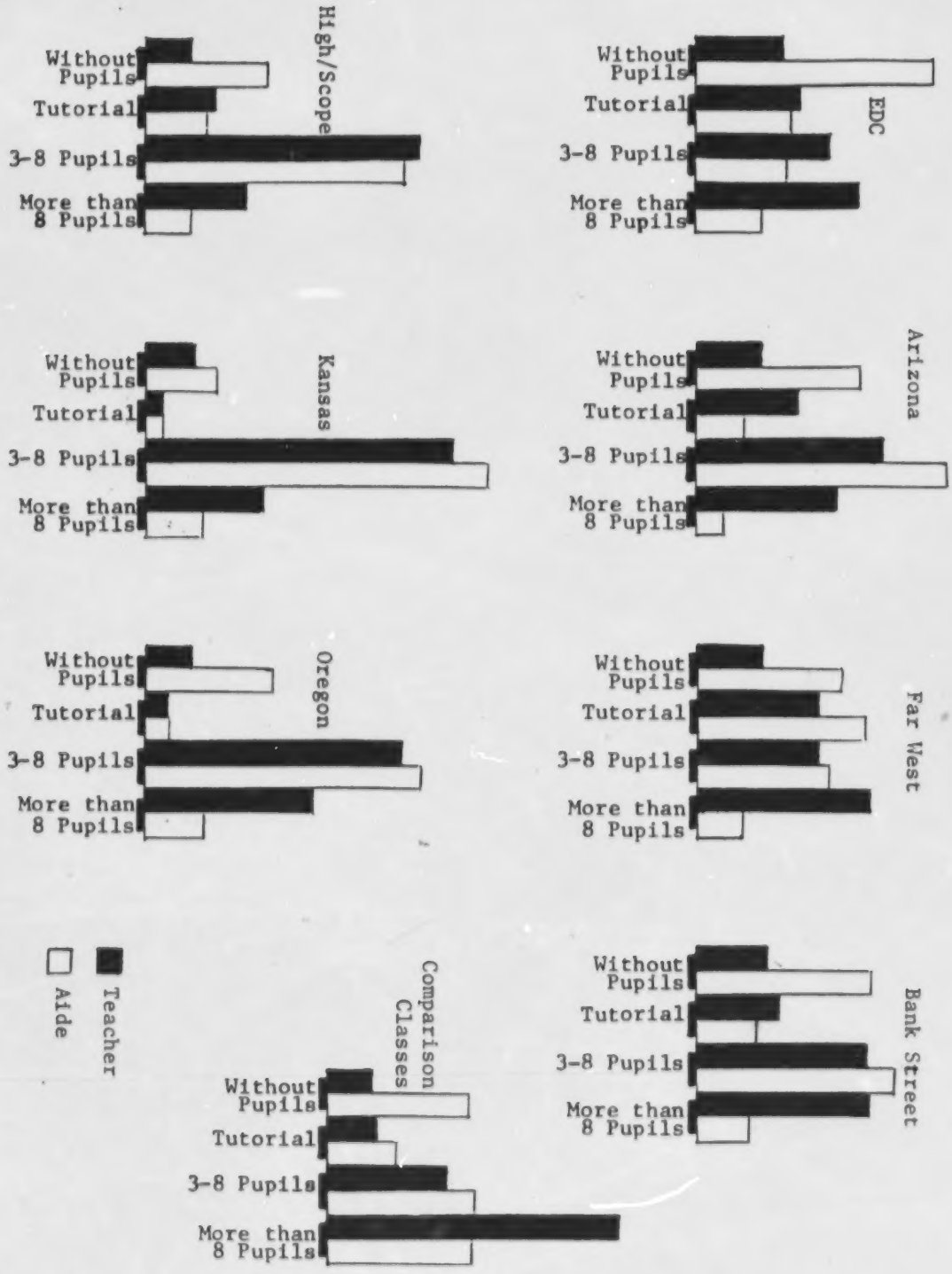
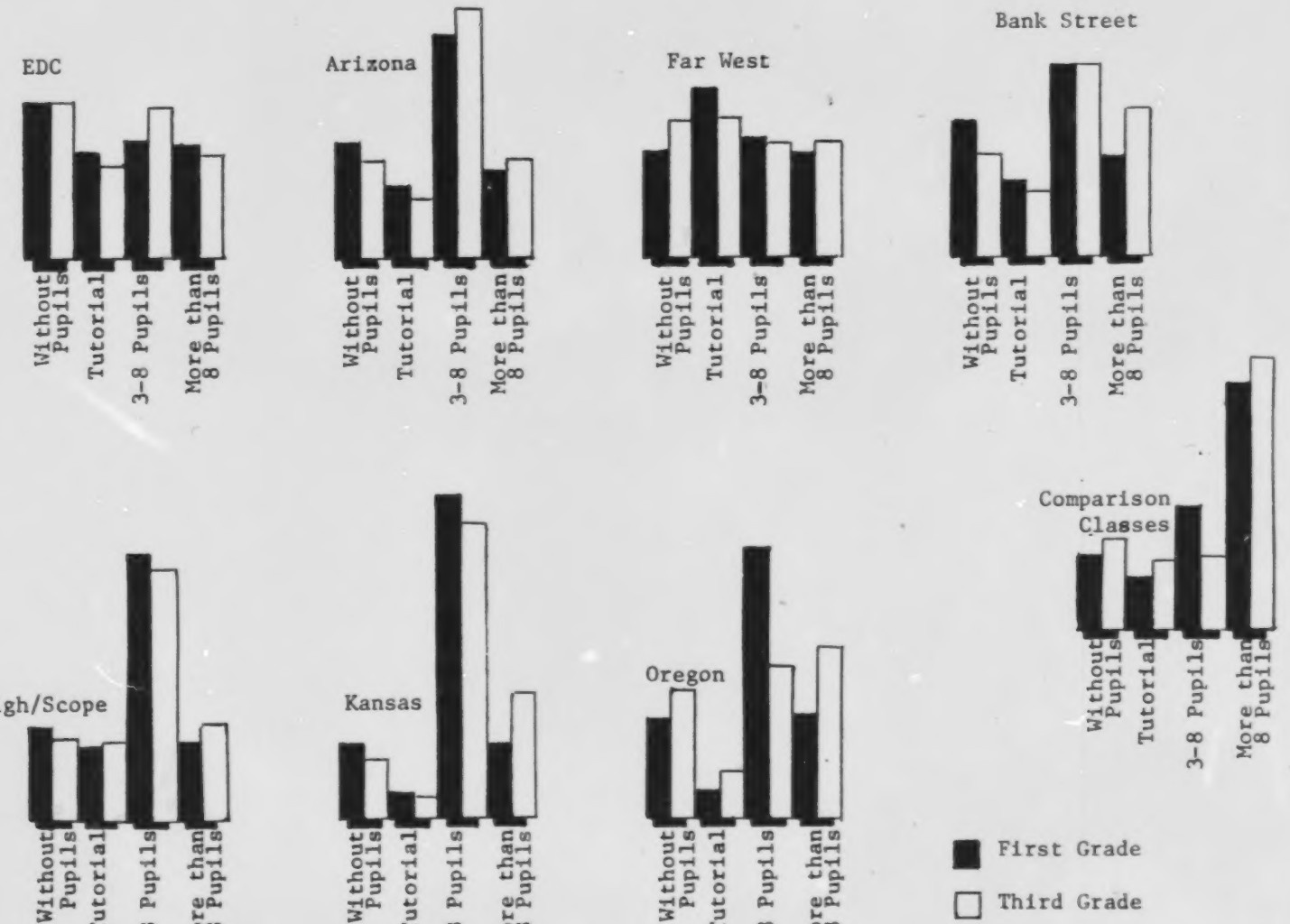


Figure 1. Time Distributions to Groupings for First Grade Teachers and Aides in Follow-Through Curricula and Comparison Classes

Figure 2. Time Distributions to Groupings for Adults in Follow-Through Curricula and Comparison Classes (First and Third Grades)



Appendices

Appendix A.I. The Follow-Through Classroom Observation Evaluation

Project Follow Through was designed as a program of "planned variation" which would allow policy makers to assess the differential impacts of diverse approaches to compensatory education. Twenty-two sponsors were selected to implement their programs in primary classrooms throughout the nation. A series of evaluation studies were planned to assess the effects of these programs. Earlier reports examined program outcomes in terms of child performance. The primary purpose of the 1973 data collection, which is the basis of this paper, was to determine how well the various sponsor programs were being implemented. The major questions which were addressed were:

- Do the observed classroom programs conform to the sponsor's stated intentions?
- To what extent are the classrooms in each program similar to each other and different from classrooms in other programs?
- Do sponsored classrooms differ from non-Follow-Through comparison classrooms?

A secondary analysis examined the relationships between observed educational processes and both cognitive and affective child outcomes.

Seven program sponsors were included in the evaluation. For each sponsor, five or six sites were selected to represent reasonably well-implemented programs in diverse geographical regions and community settings. A major criterion for site selection was the availability of baseline achievement data collected in an earlier evaluation. At each site, approximately four first grade and four third grade classrooms were selected for observation. In addition, one non-Follow-Through classroom at each grade level was selected from each site. These classrooms were pooled to serve as a common standard of comparison for all of the Follow-Through programs.

The data were collected during the Spring of 1973 and include three days of observation in each classroom. Observers were carefully selected and trained in the use of the Classroom Observation Instrument, which was developed especially for use in Follow-Through classrooms. The instrument yields a record of classroom environment, activities, and interaction.

Baseline achievement data consisted of test scores on the Wide Range Achievement Test (WRAT), which was used in the initial Follow Through evaluation studies. Pupil outcome measures used in the 1973 data collection were the Metropolitan Achievement Tests (MAT) for reading and mathematics; the Raven's Coloured Progressive

Matrices, used as a measure of problem-solving ability, the Coopersmith Self-Esteem Inventory, and the Intellectual Achievement Responsibility Scale.

For each Follow-Through program, the authors selected a group of critical variables which the sponsor believed would be indicative of successful implementation. Then each sponsor's classrooms were compared to the non-Follow-Through classrooms on the relevant variables. The sponsors' classrooms were also compared with each other, to determine the extent to which they represent distinct or overlapping programs. Partial correlations and stepwise regression analyses were used to examine the effects of classroom processes on children's learning.

The time allocation data presented in this paper were derived from one section of the Classroom Observation Instrument, the Classroom Check List. This portion of the instrument was completed approximately four times an hour throughout the three days of observation. It consists of a record of all activities occurring, child and adult groupings, adult roles, child involvement, and materials being used at a given point in time. Thus, it produces a series of "snapshots" of the classroom as it appears throughout the day. The percentage of times that a particular activity occurs during one of these observations provides an estimate of the percentage of total school time allocated to that activity.

Appendix A.II. Curricular Summaries

EDC Open Education Program

The goal of this program is to help communities implement open education. EDC did not expect classrooms to conform to specific model specifications; rather, the program is an "approach" to education that recognizes and respects differences among teachers as well as students.

Open education is based on a belief that learning is facilitated by children's active involvement. Academic skills are seen as important, but they are to be developed within a flexible environment that provides a wide variety of activities. The goals of the program are to develop problem-solving skills, self-expression, self-respect, and the ability to take responsiblity for one's own learning.

Children choose their own activities and are expected to be independent in their learning. Classrooms are usually divided into interest areas for particular activities. Various subjects are interwoven in activities and projects such as setting up and operating a store.

Cognitively Oriented Curriculum Model - High/Scope

This program was derived from the theories of Piaget and emphasizes five cognitive areas: classification, number, causality, time, and space. The curriculum includes carefully sequenced goals, a specific teaching strategy, and suggested materials.

The children choose their activities from a variety of learning centers. The day's routine includes time for children to plan their activities, carry out their plan, represent their activity in some way, and then discuss what they have done. They are expected to develop basic skills as a natural outgrowth of participation in these activities.

The program is based on the idea that learning should be self-initiated. Children are expected to be actively engaged with learning materials, and the teacher acts as a facilitator. Instruction is conducted with small groups or individual children.

Behavior Analysis Approach - University of Kansas

This program uses a token exchange system to provide immediate reinforcement to children. Earned tokens can be exchanged for participation in a variety of special activities. In order to encourage children to move from external rewards to self-motivated behavior, children are given fewer tokens as they learn a particular task.

The program uses sequenced curriculum materials with specific objectives and procedures for monitoring children's progress. The teacher works with small groups of children for reading instruction, while aides teach mathematics, spelling, and handwriting, and parent aides provide individual tutoring. The program emphasizes individualized instruction, and the children receive adult attention on a one-to-one basis even though they are taught in small groups.

Englemann-Becker Model for Direct Instruction - University of Oregon

The Englemann-Becker model is a highly structured academic program. Programmed materials and very specific teaching methods are used to teach sequenced concepts and skills. Desired behaviors are systematically reinforced by praise and enthusiastic acknowledgement.

Teachers and aides work with small or large groups of children. Teaching strategies are predefined: the teacher or aide presents a task, gives a demonstration and then tests the children's performance. Immediate feedback is provided when the children respond. They proceed only when they have succeeded with a given instructional unit.

Bank Street College of Education Approach

The Bank Street program emphasizes children's long-range development by providing a learning environment which is both challenging and supportive. Academic experiences are integrated into classroom activities such as cooking, woodworking, or experimenting with science equipment, and the children are encouraged to use language throughout the school day.

The teacher meets with the whole class to plan activites and share experiences, but works primarily with small groups or individual children. The children are free to choose activities, and are expected to take an active role in their own learning. Most activities do not require adult supervision, but are enhanced by adult response, support, recognition and extension.

Responsive Educational Model - Far West Laboratory

This model is based on the idea of structuring the classroom so that learning activities are self-rewarding and the environment is responsive to each child's needs. The goals of the program are both cognitive (developing problem-solving ability) and affective (developing self-direction, ability to learn independently, and a healthy self-concept). A variety of learning activities is considered essential to account for the different ways that children learn.

In the classroom, children are free to choose from the activities provided, which include learning centers and a variety of games and other experiences. The adults guide children's inquiry in a non-directive and open-ended manner.

Children work independently or in small groups. Teachers, aides, and volunteers may work either with small groups or with individual children.

Tucson Early Education Model - University of Arizona

The goal of this program is to develop a foundation for children's further learning. Emphasis is placed on four general areas: 1) development of language competence; 2) development of an intellectual base; 3) development of a motivational base; and 4) development of societal arts and skills. These skills are taught in a functional setting, with concepts illustrated by practical examples from the children's environment.

In the classroom, children are able to choose their activities from a variety of behavioral settings and learning settings. Small groups of children are expected to learn from each other, as well as from one-to-one interaction with adults.

Appendix A. III. Resource and Grouping Profiles for Follow-Through Curricula and Comparison Classes

Description of Variables in Tables A.1 - A.8

The time distributions reported here show the percentage of time that teachers, aides, volunteers, and pupils spend in each group setting. Instructional groupings include tutorial instruction, with one or two pupils, group instruction with 3 to 8 pupils, and group instruction with more than 8 pupils. The amount of time that adults spend without children, or that pupils spend in unsupervised activities (without adults), is also reported.

The time percentages were calculated against the base of the total number of observations made in a class, site, or curriculum. If, for example, 60 observations were made in a particular class, perhaps one teacher was observed during 54 of these, while two teachers were observed in the remaining 6. This would result in 66 teacher "occurences" and an estimated full-time equivalent teacher staff of 66/60 = 1.10. If 33 of these "occurences" were in small groups, the corresponding teacher time allocation was estimated as 33/66 or 50 percent. Full-time equivalences for aides and volunteers were estimated by computations parallel to those for the teacher staff and the corresponding time distribution estimates in a manner similar to the teacher time allocations.

The "Number of Pupils" was calculated in a manner similar to that used to obtain the full-time equivalent personnel values. Thus, the "occurences" of pupils was divided by the "Number of Observations" to yield the number of pupils who were present in the classroom at the times when observations were made. Note that this figure corresponds to attendance rather than enrollment. The pupil time allocations to grouping settings were also estimated from the "occurences" of pupils in groups of various sizes. (See Appendix A.IV for a discussion of the logic of these procedures.) Ratios of the pupil figure and those for the adults formed the "Pupil/Adult Ratios." These values are based on those reported in the Annex to Follow Through Classroom Observation Report - 1972/73 (SRI, 1974).

We have also reported means of the actual "Enrollment," "Attendance," and "Class Duration" values recorded by the classroom observers at the beginning of each day of observation.

Table A.1 Personnel Resources and Time Distributions to Groupings for EDC Classes

GRADE 1
(19 classes)

	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	18.13	48.89	16.84	30.66	42.13	
Tutorial with 1 Pupil	16.44	13.56	22.35	15.41	1.87	
Tutorial with 2 Pupils	5.32	6.06	8.38	6.14	1.47	
Group Size 3-8	26.93	18.05	35.91	24.56	14.48	5.05
Group Size > 8	33.18	13.44	16.53	23.23	40.05	14.78
Number of Occurrences	67.79	62.68	44.16	174.63		
Full-Time Equivalents	1.15	1.06	0.75	2.96		
Pupil/Adult Ratio	22.08	23.89	33.88	8.57		

Number of Observations = 59.05
Number of Pupils x Number of Observations = 1469.58
Number of Pupils = 25.34

Enrollment = 28.28
Attendance = 25.54
Class duration = 5.98

GRADE 3
(17 classes)

	Teacher	Aide	Volunteer [a]	Adult	Pupil	Group Size
Without Pupils or Adults	19.74	40.45	13.24	30.64	45.36	
Tutorial with 1 Pupil	14.73	8.36	33.10	12.84	1.30	
Tutorial with 2 Pupils	3.89	5.70	20.25	5.34	1.07	
Group Size 3-8	32.15	29.08	15.80	29.98	15.65	5.18
Group Size > 8	29.48	16.41	17.61	21.20	36.62	17.14
Number of Occurrences	63.53	59.88	14.94	138.35		
Full-Time Equivalents	1.11	1.05	0.26	2.42		
Pupil/Adult Ratio	21.61	22.94	92.00	9.92		

Number of Observations = 57.18
Number of Pupils x Number of Observations = 1372.96
Number of Pupils = 24.01

Enrollment = 26.00
Attendance = 24.29
Class duration = 5.97

[a] No volunteers in 2 classes at Site 1, 1 class each at Sites 6 and 7.

Table A.2 Personnel Resources and Time Distributions to Groupings for Arizona Classes

GRADE 1
(23 classes)

	Teacher	Aide	Volunteer [a]	Adult	Pupil	Group Size
Without Pupils or Adults	13.32	33.04	16.08	22.83	34.93	
Tutorial with 1 Pupil	16.43	5.93	19.22	11.00	1.43	
Tutorial with 2 Pupils	4.36	3.55	15.96	4.41	1.24	
Group Size 3-8	38.06	51.60	32.11	44.94	27.96	5.06
Group Size > 8	27.83	5.97	16.64	16.82	34.43	16.66
Number of Occurrences	64.04	65.35	20.48	149.87		
Full-Time Equivalents	1.11	1.14	0.36	2.61		
Pupil/Adult Ratio	19.05	18.66	59.60	8.14		

Number of Observations = 57.48
Number of Pupils x Number of Observations = 1219.52
Number of Pupils = 21.22

Enrollment = 23.23
Attendance = 21.34
Class duration = 5.94

[a] No volunteers in 1 class at Site 7, 2 at Site 11, 1 at Site 16.

GRADE 3
(24 classes)

	Teacher	Aide	Volunteer [b]	Adult	Pupil	Group Size
Without Pupils or Adults	13.59	27.28	16.25	19.91	32.57	
Tutorial with 1 Pupil	8.42	5.67	14.67	7.49	.93	
Tutorial with 2 Pupils	3.70	4.08	14.41	4.69	1.25	
Group Size 3-8	44.31	56.56	38.26	49.80	32.23	5.27
Group Size > 8	29.98	6.41	16.40	18.11	33.01	14.84
Number of Occurrences	69.83	67.75	19.38	156.96		
Full-Time Equivalents	1.18	1.14	0.33	2.65		
Pupil/Adult Ratio	18.30	18.87	65.89	8.14		

Number of Observations = 59.33
Number of Pupils x Number of Observations = 1278.31
Number of Pupils = 21.54

Enrollment = 23.17
Attendance = 21.55
Class duration = 6.00

[b] No volunteers in one class each at Sites 9, 11, 16.

Table A.3 Personnel Resources and Time Distributions to Groupings for Far West Classes

GRADE 1
(20 classes)

	Teacher	Aide	Volunteer [a]	Adult	Pupil	Group Size
Without Pupils or Adults	13.31	28.76	19.98	21.36	39.04	
Tutorial with 1 Pupil	17.80	28.10	31.76	24.77	3.39	
Tutorial with 2 Pupils	6.93	6.38	14.60	8.68	2.74	
Group Size 3-8	25.63	27.10	16.77	24.22	16.18	4.65
Group Size > 8	36.33	9.66	16.87	20.97	38.65	12.83
Number of Occurrences	60.15	65.65	36.90	162.70		
Full-Time Equivalents	1.02	1.12	0.63	2.77		
Pupil/Adult Ratio	18.83	17.26	30.70	6.96		

Number of Observations = 58.75
Number of Pupils x Number of Observations = 1132.70
Number of Pupils = 19.28

Enrollment = 20.95
Attendance = 19.42
Class duration = 5.65

[a] No volunteers in 1 class each at Sites 4 and 13.

GRADE 3
(20 classes)

	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	15.71	39.01	26.56	26.66	40.83	
Tutorial with 1 Pupil	17.93	13.30	34.20	18.52	2.44	
Tutorial with 2 Pupils	7.59	8.88	10.29	8.72	2.40	
Group Size 3-8	23.50	27.20	13.77	23.10	13.90	4.83
Group Size > 8	35.27	11.61	15.18	22.99	40.42	14.11
Number of Occurrences	68.95	59.95	31.95	160.85		
Full-Time Equivalents	1.20	1.04	0.56	2.79		
Pupil/Adult Ratio	18.73	21.53	40.39	8.02		

Number of Observations = 57.60
Number of Pupils x Number of Observations = 1291.05
Number of Pupils = 22.41

Enrollment = 23.47
Attendance = 22.15
Class duration = 5.95

Table A.4 Personnel Resources and Time Distributions to Groupings for Bank Street Classes

GRADE 1
(19 classes)

	Teacher	Aide	Volunteer[a]	Adult	Pupil	Group Size
Without Pupils or Adults	13.77	36.28	27.36	26.80	33.77	
Tutorial with 1 Pupil	12.44	7.04	27.56	10.43	1.28	
Tutorial with 2 Pupils	4.35	4.79	7.87	4.82	1.20	
Group Size 3-8	34.69	40.62	21.39	37.73	25.76	5.49
Group Size > 8	34.75	11.27	15.82	20.21	37.99	15.10
Number of Occurrences	61.21	83.90	10.68	155.79		
Full-Time Equivalents	1.08	1.48	0.19	2.75		
Pupil/Adult Ratio	20.45	14.92	116.95	8.04		

Number of Observations = 56.63
Number of Pupils x Number of Observations = 1251.71
Number of Pupils = 22.10

Enrollment = 24.47
Attendance = 22.07
Class duration = 6.08

[a] No volunteers in 1 class each at Sites 4, 6, and 8; 2 classes at Site 10.

GRADE 3
(19 classes)

	Teacher	Aide	Volunteer[b]	Adult	Pupil	Group Size
Without Pupils or Adults	9.38	29.94	49.30	20.41	26.60	
Tutorial with 1 Pupil	8.91	6.81	7.23	7.84	1.05	
Tutorial with 2 Pupils	4.74	5.77	9.31	4.98	1.35	
Group Size 3-8	34.45	40.61	25.26	37.79	23.39	5.84
Group Size > 8	42.51	16.87	8.90	28.99	47.61	15.50
Number of Occurrences	61.53	66.11	12.79	140.42		
Full-Time Equivalents	1.08	1.16	0.22	2.46		
Pupil/Adult Ratio	21.54	20.04	103.57	9.44		

Number of Observations = 57.11
Number of Pupils x Number of Observations = 1324.84
Number of Pupils = 23.20

Enrollment = 24.70
Attendance = 23.09
Class duration = 6.27

[b] No volunteers in any class at Site 4, in 3 classes at Site 10.

Table A.5 Personnel Resources and Time Distributions to Groupings for High/Scope Classes

GRADE 1
(18 classes)

	Teacher	Aide	Volunteer [a]	Adult	Pupil	Group Size
Without Pupils or Adults	8.97	24.78	18.28	18.05	23.12	
Tutorial with 1 Pupil	9.72	7.00	9.86	8.77	1.37	
Tutorial with 2 Pupils	3.84	5.69	5.86	5.17	1.64	
Group Size 3-8	56.27	53.17	39.34	52.77	45.57	5.92
Group Size > 8	21.20	9.36	26.65	15.24	28.31	12.72
Number of Occurrences	68.22	81.67	20.56	170.44		
Full-Time Equivalents	1.23	1.47	0.37	3.06		
Pupil/Adult Ratio	17.11	14.30	56.84	6.85		

Number of Observations = 55.67
Number of Pupils x Number of Observations = 1167.56
Number of Pupils = 20.97

Enrollment = 23.41
Attendance = 20.90
Class duration = 6.28

[a] No volunteers in any class at Site 3; 1 class at Site 1; 2 at Site 7.

GRADE 3
(19 classes)

	Teacher	Aide	Volunteer [b]	Adult	Pupil	Group Size
Without Pupils or Adults	10.37	24.29	6.91	16.27	25.40	
Tutorial with 1 Pupil	8.66	9.85	21.19	10.24	1.30	
Tutorial with 2 Pupils	2.83	4.48	24.66	4.91	1.32	
Group Size 3-8	50.87	48.79	31.57	50.17	37.74	5.82
Group Size > 8	27.28	12.59	15.66	18.41	34.23	14.39
Number of Occurrences	66.68	79.63	20.21	166.47		
Full-Time Equivalents	1.21	1.44	0.37	3.02		
Pupil/Adult Ratio	19.33	16.18	63.73	7.74		

Number of Observations = 55.10
Number of Pupils x Number of Observations = 1288.76
Number of Pupils = 23.39

Enrollment = 25.81
Attendance = 23.59
Class duration = 6.23

[b] No volunteers in 3 classes at Site 3.

Table A.6 Personnel Resources and Time Distributions to Groupings for Kansas Classes

GRADE 1
(18 classes)

	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	10.62	14.37	19.15	14.56	5.55	
Tutorial with 1 Pupil	2.42	1.60	30.38	3.98	0.68	
Tutorial with 2 Pupils	.28	1.40	4.18	1.60	0.58	
Group Size 3-8	62.73	70.59	28.89	65.69	62.18	5.87
Group Size > 8	23.95	12.04	17.40	14.17	31.00	13.57
Number of Occurrences	62.39	109.56	56.56	228.50		
Full-Time Equivalents	1.10	1.93	1.00	4.03		
Pupil/Adult Ratio	22.70	12.93	25.05	6.20		

Number of Observations = 56.72
Number of Pupils x Number of Observations = 1416.67
Number of Pupils = 24.98

Enrollment = 28.08
Attendance = 25.19
Class duration = 6.36

GRADE 3
(17 classes)

	Teacher	Aide	Volunteer [a]	Adult	Pupil	Group Size
Without Pupils or Adults	6.89	14.14	21.21	11.98	12.34	
Tutorial with 1 Pupil	1.95	1.27	20.97	2.45	0.34	
Tutorial with 2 Pupils	.57	1.20	15.51	1.80	0.48	
Group Size 3-8	52.25	63.46	28.46	58.37	47.48	6.24
Group Size > 8	38.33	19.93	13.86	25.40	39.36	11.89
Number of Occurrences	58.12	127.41	15.65	201.18		
Full-Time Equivalents	1.03	2.25	0.28	3.55		
Pupil/Adult Ratio	26.56	12.12	98.72	7.67		

Number of Observations = 56.65
Number of Pupils x Number of Observations = 1543.53
Number of Pupils = 27.25

Enrollment = 29.22
Attendance = 27.27
Class duration = 6.32

[a] No volunteers in one class at Site 7.

Table A.7 Personnel Resources and Time Distributions to Groupings for Oregon Classes

GRADE 1
(19 classes)

	Teacher	Aide	Volunteer [a]	Adult	Pupil	Group Size
Without Pupils or Adults	9.14	26.53	17.02	19.45	22.20	
Tutorial with 1 Pupil	2.47	4.20	11.78	3.74	0.46	
Tutorial with 2 Pupils	2.16	.83	16.02	1.67	0.40	
Group Size 3-8	52.54	56.02	23.43	53.83	37.84	5.65
Group Size > 8	33.71	12.42	31.75	21.30	39.11	14.76
Number of Occurrences	59.26	88.74	4.47	152.47		
Full-Time Equivalents	1.08	1.62	0.08	2.78		
Pupil/Adult Ratio	20.68	13.82	272.35	8.04		

Number of Observations = 54.90
Number of Pupils x Number of Observations = 1225.95
Number of Pupils = 22.33

Enrollment = 24.00
Attendance = 22.38
Class duration = 5.82

[a] No volunteers in 2 classes each at Sites 3 and 11; 1 class at Site 7.

GRADE 3
(19 classes)

	Teacher	Aide	Volunteer [b]	Adult	Pupil	Group Size
Without Pupils or Adults	17.26	35.76	34.05	26.25	32.13	
Tutorial with 1 Pupil	4.69	5.10	9.58	5.50	0.63	
Tutorial with 2 Pupils	2.80	3.24	26.07	3.65	0.95	
Group Size 3-8	28.53	33.97	7.90	29.71	19.43	6.25
Group Size > 8	46.72	21.93	22.39	34.88	46.86	12.84
Number of Occurrences	61.21	65.05	9.58	135.84		
Full-Time Equivalents	1.06	1.12	0.16	2.34		
Pupil/Adult Ratio	21.22	19.95	135.80	9.56		

Number of Observations = 57.95
Number of Pupils x Number of Observations = 1298.42
Number of Pupils = 22.41

Enrollment = 26.07
Attendance = 23.82
Class duration = 6.16

[b] No volunteers in 1 class at Site 3; 2 classes at Site 11.

Table A.8 Personnel Resources and Time Distributions to Groupings for Comparison Classes

GRADE 1
(35 classes)

	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	8.14	28.32	12.47	14.61	30.85	
Tutorial with 1 Pupil	7.06	8.75	17.37	7.85	0.59	
Tutorial with 2 Pupils	2.06	3.86	16.28	3.54	0.52	
Group Size 3-8	23.74	29.83	10.81	24.83	10.56	6.30
Group Size > 8	59.00	29.24	43.07	49.16	57.48	17.33
Number of Occurrences	62.77	20.29	9.89	92.94		
Full-Time Equivalents	1.11	0.36	0.17	1.64		
Pupil/Adult Ratio	21.94	67.87	139.28	14.82		

Number of Observations = 56.57
Number of Pupils x Number of Observations = 1377.26
Number of Pupils = 24.35

Enrollment = 26.07
Attendance = 24.30
Class duration = 6.04

GRADE 3
(36 classes)

	Teacher	Aide	Volunteer	Adult	Pupil	Group Size
Without Pupils or Adults	11.89	22.13	22.93	17.76	27.91	
Tutorial with 1 Pupil	7.64	25.99	25.84	10.63	0.81	
Tutorial with 2 Pupils	2.14	14.37	6.52	2.78	0.43	
Group Size 3-8	13.00	17.38	17.92	13.75	5.38	6.18
Group Size > 8	65.33	20.14	26.79	55.08	65.48	18.76
Number of Occurrences	62.53	14.67	15.00	92.19		
Full-Time Equivalents	1.09	0.26	0.26	1.60		
Pupil/Adult Ratio	23.26	99.18	96.98	15.78		

Number of Observations = 57.50
Number of Pupils x Number of Observations = 1454.78
Number of Pupils = 25.30

Enrollment = 27.34
Attendance = 25.34
Class duration = 6.19

Appendix A.IV. Conversion of Instructional to Pupil Time

The amount of teaching time devoted to a particular grouping context in which an adult participates, $\underline{\tau}$, can be summarized as the product of three factors: (1) The number of instructional personnel in the classroom, $\underline{\pi}$, (2) the proportion of teaching time devoted to the specific context, $\underline{\gamma}$, and (3) the daily duration of instruction, $\underline{\delta}$, i.e., $\underline{\tau} = \underline{\pi}\,\underline{\gamma}\,\underline{\delta}$. The aggregate daily time pupils are exposed to instruction in that grouping context, $\underline{\alpha}$, is then equal to the product of the group size, $\underline{k}$, and the instructional time offered ($\underline{\tau}$), i.e., $\underline{\alpha} = \underline{k}\,\underline{\tau}$. As the average pupil in a class of size $\underline{N}$ is proportionately exposed to only one part out of $\underline{N}$ of the aggregate time, the average daily pupil exposure time in a grouping context is $\underline{\theta}\ (= \underline{\alpha}/\underline{N}) = \underline{k}\,\underline{\tau}/\underline{N}$. As the daily exposure time can also be written as the product of the proportionate pupil exposure time in the context, $\underline{\lambda}$, and the daily duration of instruction ($\underline{\delta}$), i.e., as $\underline{\theta} = \underline{\lambda}\,\underline{\delta}$, this implies that

$$\underline{\lambda}\,\underline{\delta} = \underline{\theta} = \underline{k}\,\underline{\tau}/\underline{N}$$

$$= \underline{k}\,[\underline{\pi}\,\underline{\gamma}\,\underline{\delta}]/\underline{N}$$

$$= \left[\frac{\underline{\pi}}{\underline{N}}\right][\underline{k}\,\underline{\gamma}]\,\underline{\delta},$$

i.e., that

$$\underline{\lambda} = \left[\frac{\underline{\pi}}{\underline{N}}\right]\underline{k}\,\underline{\gamma}.$$

That is, the proportion of pupil time spent in a grouping context equals the product of (1) the personnel intensity ratio $\left(\frac{\pi}{N}\right)$, (2) the group size, and (3) the proportion of instructional time devoted to that context.

If we write the intensity ratio as ρ, and index the supervised grouping contexts with the size of the group then

$$\lambda_k = k \rho \gamma_k .$$

If we index unsupervised time for pupils and time without children for adults with 0 ("zero"), then

$$\sum_{k=0}^{N} \lambda_k = 1 \qquad (1)$$

$$= \sum_{k=1}^{N} k \rho \gamma_k = \rho \sum_{k=1}^{N} k \gamma_k$$

$$= \rho \sum_{k=0}^{N} k \gamma_k \qquad (2)$$

$$= \rho \mu , \text{ and}$$

$$\lambda_0 = 1 - \sum_{k=1}^{N} \lambda_k = 1 - \rho \mu , \qquad (3)$$

where μ is the mean group size.

We can compute the proportion of pupil time in a range of group sizes (say $\underline{\ell}_1$, to $\underline{\ell}_2$) as

$$\sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{\lambda}_{\underline{k}} = \sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{k}\,\rho\,\underline{\gamma}_{\underline{k}} = \rho \sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{k}\,\underline{\gamma}_{\underline{k}} .$$

The ratio of pupil to teaching time in this range is

$$\frac{\sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{k}\,\underline{\gamma}_{\underline{k}}}{\sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{\gamma}_{\underline{k}}} = \underline{\mu}(\underline{\ell}_1, \underline{\ell}_2),$$

the mean group size for groups having between $\underline{\ell}_1$, and $\underline{\ell}_2$ pupils.

Therefore, denoting $\sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{\lambda}_{\underline{k}}$ by $\underline{\lambda}(\underline{\ell}_1, \underline{\ell}_2)$, and

$\sum_{\underline{k}=\underline{\ell}_1}^{\underline{\ell}_2} \underline{\gamma}_{\underline{k}}$ by $\underline{\gamma}(\underline{\ell}_1, \underline{\ell}_2)$, then

$$\underline{\lambda}(\underline{\ell}_1, \underline{\ell}_2) = \rho\,[\underline{\mu}(\underline{\ell}_1, \underline{\ell}_2)][\underline{\gamma}(\underline{\ell}_1, \underline{\ell}_2)]. \qquad (4)$$

This average result holds for any contextual partitioning of instructional and pupil time, which can be described by group size distributions, not merely those defined by group sizes.